MATERIAL SUBMITTED BY THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ON THE
CLEAN WATER ACT AND APPLICABLE COASTAL ZONE STATUTES

(This document was submitted in draft form and is still undergoing internal review.)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

January 9, 1998

Subject: EPA's Assessment and General Comments on NMFS's Draft Proposal to Improve Oregon Forest Practices

From: Elbert Moore, EPA Office of Ecosystems and Communities

To: Rick Applegate, NMFS

General Summary

EPA believes that NMFS's Draft Proposal to Improve Oregon Forest Practices is well researched and on target with its recommendations. The NMFS has done an excellent job in their statement of objectives, distilling critical elements, and providing supportive materials and rationale for recommendations. The use of three science panels- landslide, riparian, and cumulative effects - adds to the credibility as well as the precision and confidence of the recommendations. The draft proposal on Oregon forest practices (Chapter V.A.) and Appendix 3 are particularly thoughtful and useful in furthering the discussion of land use effects on aquatic ecosystems. We also appreciate the identification of knowledge gaps as well as the framework for future inter-agency scientific efforts that will support joint resource management efforts.

The NMFS Objectives articulated on pages 23 - 26 of the Draft Proposal are consistent with the direction EPA is taking in its policies and programs under the Clean Water Act (CWA) and Coastal Nonpoint Pollution Control Program under Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA). We particularly support the view that objectives for forest lands in Coastal Oregon should protect and restore natural ecological processes and functions and that by doing so we will meet goals for both clean water and protected species. Protecting and restoring beneficial uses (e.g. aquatic life) of aquatic ecosystems is central to our water quality standards program and antidegradation policies, the TMDL Program, the Nonpoint Source Program, Safe Drinking Water Protection Program, and many others within the agency. It is within EPA's responsibilities to ensure that water quality issues are appropriately addressed through the Oregon Plan and to ensure the Plan's success in protecting and restoring aquatic resources.

The proposed interim measures outlined in Section V.A. are compatible with EPA's policy positions concerning both CWA implementation and CZARA Section 6217 issues and would satisfy many of EPA's outstanding concerns (**see Attachment A - Selected Findings For The Oregon Coastal Nonpoint Program**). Although we believe that further discussion and refinement are warranted, the basic recommendations on monitoring, watershed analysis, and cumulative effects would facilitate the development and acceptance of forest land TMDL's required under the CWA Section 303(d). Throughout the draft proposal, there are discussions and recommendations that are consistent with and help forward CWA goals. There are, however, other areas that may fall short of the mark. This EPA memo provides preliminary feedback on NMFS's draft proposal. There are other key individuals within the EPA Regional Office with expertise on these issues that were unable to comment within this tight time frame. However, we do appreciate the opportunity to participate in these discussions and we anticipate further discussion and commentary.

(1) Roles of Protection and Restoration

The restoration section should be greatly expanded, possibly including elements from the GWEB Watershed Assessment Handbook as well as NMFSs comments on that document. The "Restoration Activities" Section (pg. 75) should be expanded and a framework for decision-making developed. We emphasize this because of the importance of addressing both future management and legacy conditions. The Objective Statements listed in section III.D. provide a strong basis for addressing both restoration and protection needs. We strongly support these objectives and concur that they complement the CSRI objectives in substantive ways. In order to more clearly carry this thinking forward into the recommendations, the 'Alternative Means to Achieve Objectives' section should be more closely tied to the discussion of restoration and protection as well as a conceptual framework for prioritization and sequencing of events. Rationale should be provided regarding the various and preferred approaches to restoration and establishing priorities. Pages 37-40 provide very helpful information. The next step is to fill in these gaps. Another specific area to be addressed that would greatly facilitate ESA and CWA implementation is more deliberately addressing the private/state/federal *land management* relationship. This is a particularly critical issue in a number of areas (both topical and geographic) such as landscape or basin scale restoration (including road management issues on mixed land ownerships) and monitoring strategies. Also, it should be stressed that restoration should not be used as mitigation to avoid management measures focused on long-term recovery. Natural disturbance regimes and the interaction with human induced change should be assessed to identify risks, priorities, sequence, and type of restoration and protection actions.

(2) Landscape Assessment/ Watershed Analysis

The issue of spatial and temporal scales and its importance to understanding the processes that shape and maintain aquatic habitat are central to the landscape or watershed analysis. Concepts of landscape ecology (terrestrial and stream network patterns, processes, composition, and structure) and conservation biology (metapopulations, spatial and temporal distribution, demographics) should be incorporated into the analysis methodology to address larger scale processes and issues. This is consistent with NMFS's Ecological Basis discussion but is not clearly carried forward into the recommendations. Currently, biotic processes are only assessed at the site-scale. Clarification of the options for watershed assessment especially the benchmark analyses is needed. It appears that "option 2" is the template for further analysis of "option 1." The combination of these two options could produce the conceptual framework needed to address issues of scale and cumulative effects. Additionally, the discussion of CE's analysis on pg 86 outlines three different conceptual approaches. Rather than three approaches, the primary issue is one of scale - the document is really presenting three different scales with which to focus and concludes that a multi-scale approach is warranted.

Migration and dispersal corridors, key habitat areas, as well as current and potential refugia and source areas should be identified and effects of fragmentation and patch number and size analyzed. We acknowledge that much of this could be accomplished through the watershed analysis process that is recommended.

Numerous individual measures are provided to address hydrologic, erosional, and riparian processes. However, a framework is necessary to relate these individual processes at the stream reach, watershed, and basin scale. Absence of a conceptual framework curtails our ability to synthesize information from the WSA modules into a coherent landscape picture as well as the development of testable hypotheses. Without testable hypotheses it is difficult to implement "adaptive management." Currently, a unifying or organizing framework does not exist. This same omission has proven to be a hindrance in Washington's WSA process as well. If individual measures are developed and applied independently, it will focus attention on site-specific issues without addressing watershed and basin-scale dynamics. The watershed and cumulative effect's analyses should provide this unifying framework through the application of landscape ecology and conservation biology principles. Stratification of the terrestrial and stream network based on inherent condition and natural disturbance regimes provides a starting place. Overlaying anthropogenic disturbances and current conditions should help describe the effects of land use on processes operating at various spatial and temporal scales and identify risks to aquatic resources. Using spatially explicit data, fragmentation and landscape patterns may also be assessed. If the focus is on salmon recovery then the spatial and temporal strategies/dynamics of these species must be accounted for.

Joint efforts to test assumptions and modify assessment processes are required as this is relatively speaking a new area of study - See Attachment A (sources of information include "An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins" (PNW-GTR-405 June 1997) and the Rogue/Umpqua Basin-Scale Risk Assessment Method).

Any landscape assessment or WSA process must identify land management practices that a) protect waters presently meeting water quality standards and b) restore impaired waters to existing water quality standards. Several weaknesses currently exist in Washington's WSA that reduce its effectiveness to address the above issues. For instance, WSA does not directly address restoration of waters impaired by past forest practices. EPA requires reasonable assurance that water quality standards will be attained through identified mechanisms and will address past, current, and future practices. It is important to note that several key areas that would augment Washington's WSA process have been identified by Collins and Pess (1997) and are critical to the applicability of WSA to CWA compliance. The following recommendations concerning Washington's WSA process should be incorporated into any landscape assessment attempting to meet CWA needs (Collins and Pess. 1997. Evaluation of forest practices prescriptions from Washington's watershed analysis program. Journal of the American Water Resources Association. Vol.33, No.5):

A.) Include a mandatory comprehensive monitoring and adaptive management program that monitors compliance, validates best management practice effectiveness, characterizes cumulative effects across the landscape, and monitors recovery progress and trends in resource conditions over time.

B.) Strictly adhere to the format linking prescriptions to hazards and resource concerns, providing written technical justifications for the prescriptions chosen, with identified measures to track performance through the monitoring program.

C.) Ensure a broad representation of technical and resource perspectives on prescription teams.

D.) Develop and adopt Version 2.0 of the water quality module. In particular, address concerns in EPA's letter of contingent support for Version 1.0. Ensure that assumptions within the module are addressed and resolved as part of the monitoring program.

E.) Expand the scope of the hydrology module to include changes to hydrologic streamflow regimes (i.e., historic, current, and future peak and summer low flow characteristics as well as timing). Include in the monitoring program, investigation of the interaction between hydrology and other system components (e.g., channel bed aggravation, bank erosion) and the effects of road density on drainage density.

F.) Develop prescriptions for riparian management zones based on geomorphically-based channel classification.

G.) Improve and expand the synthesis process to ensure more thorough consideration of the interactions between modules. Synergistic effects need to be more explicitly defined in an analytic process.

H.) Establish restoration of impaired habitat or water quality as an objective to help drive the definition of appropriate management prescriptions.

(3) Cumulative Effects

EPA agrees with NMFS on the necessity for assessing the watershed context of separate or individual projects over time in order to more accurately weigh decisions affecting impacts and protection. We also agree that the current Forest Practice Administrative Rules do not encourage or require watershed assessments in the normal course of business. EPA and NOAA's findings on Oregon's Coastal Nonpoint Pollution Control Program

identified cumulative effects as one of the areas where existing practices under the FPA and FPR should be strengthened to attain water quality standards and fully support beneficial uses. Water temperature, sediment transport, road density, and hydrological modification were factors identified as being important to consider on a watershed scale.

Early in the document (pg. 20) cumulative effects are defined by Sidle (1989) as "changes to the environment caused by the interaction of natural ecosystem processes with the effects of land use, distributed through space and time, or both." The basic elements of this definition should form the basis of watershed analysis (WSA) and cumulative effects (CE's) discussions. Discussion of natural disturbance vs anthropogenic disturbance and the issue of risk needs to be factored into WSA and cumulative effects elements. The document discusses both 'pulse' and 'press' disturbances, but does not carry the discussion forward to identify different effects or approaches to address these different disturbance regimes.

Developing a nested or hierarchial approach to watershed analysis (WSA) and cumulative effects (CE's) will allow the agencies to track status and trends and to predict cause and effect relationships based on future land use scenarios. To this end, the terrestrial and stream network should be stratified according to inherent potential and natural disturbance. In this way, BMPs and other management systems may be evaluated according to conditions and constraints inherent in individual landscape units. For example, monitoring data in northern California were unable to conclude that BMPs met stated objectives across the forested landscape. These BMPs were applied uniformly across a diverse landscape regardless of differences in natural disturbance regimes, inherent conditions, or risks to aquatic habitat. Although BMPs may have functioned more reliably in certain landscape units, researchers were unable to make this determination because the landscape was not stratified prior to BMP establishment or monitoring (pg 26, item #11). Reference locations spanning an array of conditions should be identified and used to assess recovery. Pg. 64 provides the basis of a good discussion - **See Attachment B**.

NMFS should further address the issue of thresholds and BMP effectiveness. There has been much written in the literature regarding thresholds in urban environments (Chris May, Derek Booth, and Jim Karr, University of Washington). This discussion should occur and should be linked to concepts of legacy, restoration, and protection. Additionally, the monitoring strategy should be intimately tied to WSA and CE's analysis.

(3) Monitoring and Adaptive Management

The monitoring program should incorporate a multiple scale approach, and should focus on processes and indicators identified during the watershed and cumulative effect's analyses. A stratified probability sampling design based on the landscape and stream network stratification used in WSA is recommended. This could be developed from the basic 'streamscape' concept introduced on page 36. Stratification concepts are also an element of Oregon's Watershed Assessment Guidance for Watershed Councils. Ultimately, this nested monitoring design allows information collected at various scales to be analyzed and synthesized to produce an accurate high resolution image. Information collected at any one scale should support efforts at other scales.
To be successful, a consistent and strategic approach to indicator selection (via watershed and cumulative effects analysis) as well as standardized protocols should be developed. A significant concern that we have with the CSRI objectives (which are summarized in section III.D.) is that adequate, quantitative monitoring data to support progress toward and attainment of these objectives is developed. Additionally, the current ODF Forest Practices Monitoring Program does not reflect the range of parameters and scales necessary to adequately monitor status and trends. Programmatic parameters and management targets should be tracked, but it is critical that landscape, riparian, and instream processes also be monitored. Over time this will enhance an understanding of cause and effect relationships.

Issues related to data quality, storage, accessability, and analysis are also important to address. It should be noted that evaluation of Washington's WSA has been extremely difficult owing to the absence of a mandatory

monitoring program. Baseline, implementation, effectiveness, and validation monitoring should occur (see Attachment B). While these monitoring elements are described in the NMFS document, there does not appear to be a framework for integrating these elements into a comprehensive approach.

As previously mentioned, the absence of a conceptual framework inhibits managers ability to develop testable hypothesize. Adaptive management encourages action where action is required while demanding rigorous research protocols to be followed. The success of adaptive management rests on the development of testable hypotheses as well as rigorous assessment of resultant data. Only thoughtful, well planned evaluations will lead to our learning from management actions. In addition to testable hypotheses, actions must be related to a strong monitoring program and explicitly defined feedback mechanisms. A transparent decision-making process and annual reporting will facilitate accountability as well as dissemination of findings. Science panels should be used to review both monitoring and adaptive management findings and recommendations.

(4) Broad Protection of State Waters - Protection of Small, Non-Fish Bearing, and Seasonal Streams
Much discussion centers on the distinction between fish and non-fish bearing waters. Ecologically speaking, we should be focusing on the processes and functions of these various systems rather than an arbitrary and often incorrect attribute. Additionally, the CWA embraces all waters of the U.S. and includes protection for all aquatic life forms including both salmonids and non-salmonids. As an example, wetlands should be viewed as both habitat for salmonids as well as systems that occur within the watershed that moderate landscape processes. Similar arguments can be made for seasonal stream systems above perennial fish bearing streams.

EPA and NOAA expressed particular concern about adequate protection of medium, small, seasonal, and non-fish bearing streams in the findings on Oregon's Coastal Nonpoint Pollution Control Program. It was determined that "under existing State forest practices, medium, small, seasonal, and non-fish bearing streams may be subject to loss of sediment retention capacity, increases in delivery of fine sediments, and increases in temperature due to loss of riparian vegetation. Another concern is provision of adequate long-term supplies of large woody debris in medium, small, seasonal, and non-fish bearing streams, a shortage of which can result in decreased sediment storage in upstream tributaries, increased transport and deposition downstream, and overall adverse impacts to beneficial uses." The proposed changes in Section V of NMFS' draft proposal are excellent in strengthening protection of these streams. However, the discussion of temperature on page 69 should be expanded to include channel morphology, discharge, and sediment input rather than just shade. The discussion of riparian areas and functions should be reviewed for clarity.

(5) Road Maintenance and Density Management
EPA and NOAA's findings on Oregon's Coastal Nonpoint Pollution Control Program identified road density management and maintenance, particularly on so-called "legacy" roads as one of the areas where existing practices under the FPA and FPR should be strengthened to attain water quality standards and fully support beneficial uses. The recommendations made by NMFS in Section V of the draft proposal would significantly address these concerns. We particularly support the development and implementation of road management plans at the ownership and watershed scale as long as they are closely linked to watershed analysis and cumulative effects assessments.

(6) Hydrologic Function
The document states that the "hydrologic function is addressed by specific road management prescriptions." This is only part of the equation. How will hydrologic maturity/succession issues be addressed (vegetation patters/composition/structure) with respect to both peak flows and base flows?

(7) Protection of High Risk Landslide Areas
EPA agrees with NMFS that mass wasting events beyond that which occurs as part of the natural disturbance regime has adverse impacts on water quality and salmon habitat. EPA and NOAA's findings on Oregon's

Coastal Nonpoint Pollution Control Program identified protection of areas at high risk for landslides as one of the areas where existing practices under the FPA and FPR should be strengthened to attain water quality standards and fully support beneficial uses. The recommendations made by NMFS in Section V of the draft proposal would significantly address these concerns.

We highly support the development of a shallow landslide potential map for the Oregon Coast Range although 10 meter vs 30 meter Digital Elevation Model data should be strongly considered. In addition, there are other data layers that would greatly facilitate this effort (e.g., precipitation, vegetation, hydrology). The federal agencies including EPA should be working jointly to fill information voids and to deliver synthesized data in a format appropriate for landscape-scale coarse screen analysis.

(8) Impacts of Chemicals

EPA and NOAA's findings on Oregon's Coastal Nonpoint Pollution Control Program identified the adequacy of stream buffers for application of certain chemicals as one of the areas where existing practices under the FPA and FPR should be strengthened to attain water quality standards and fully support beneficial uses. The findings note that rule revisions in January of 1997 strengthened aspects of chemical applications in riparian areas so that a 60 foot buffer is now required on type N streams for direct aerial application of fungicides and non-biological insecticides except as approved by the State forester. However, the rules seem to leave small type N streams at risk since there are no restrictions for aerial application of herbicides on these streams. The recommendations made by NMFS in Section V of the draft proposal take some steps in addressing these concerns, although more specificity may be needed.

(9) Accountability Processes

Much of the language in this document is advisory. For example recommendations are made that certain areas should be "avoided." Since much of this effort will remain "voluntary" how will decision-making proceed and actions be tracked and monitored. A framework should be developed for logic tracking, analysis and decision making, and adaptive feedback. Absence of this detail including mandatory monitoring has hampered Washington's WSA program.

(10) Clarifying/ Supplying Definitions

- Define terms related to "key attributes" and " key principles."
- Terms such as transition zones should be defined. Are you including areas that are currently bedrock owing to LWD depletion?
- Define what is meant by "historic" anadromous fish streams

_____

Attachment A

FINDINGS FOR THE
OREGON COASTAL NONPOINT PROGRAM

FOREWORD

This document contains the findings for the coastal nonpoint pollution control program submitted by the State of Oregon pursuant to Section 6217(a) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA). The findings are based on a review of the Pollution Prevention and Control Program for Oregon's Coastal Waters, Final Program Submittal, July 1995. The National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA) reviewed this information and evaluated the extent to which it conforms with the requirements of CZARA.

NOAA and EPA commend the State of Oregon on the substantial time and effort put into developing this program and appreciate the commitment the State has shown to complete an ambitious task with limited resources. NOAA and EPA will continue to work with coastal states and territories to ensure that these findings represent an accurate assessment of current state and territorial abilities and efforts to address coastal nonpoint source pollution. NOAA and EPA recognize that further administrative changes that will affect these findings may be made to the coastal nonpoint program and, once such changes are finalized, will review these findings in light of the changes and make any necessary adjustments.

APPROVAL DECISION

NOAA and EPA approve the coastal nonpoint pollution control program submitted by the State of Oregon pursuant to Section 6217(a) of the Coastal Zone Act Reauthorization Amendments of 1990, subject to certain conditions.

This document provides the specific findings used by EPA and NOAA as the basis for the decision to approve the State's program. It also provides the rationale for the findings and includes the conditions that will need to be met for Oregon to receive final approval of its program. We recognize that Oregon has already proposed some changes for its program that would, if finalized, ensure the implementation of the management measures in conformity with the Section 6217(g) guidance. In those cases, the conditions are based on the State's proposed changes. The timeframes associated with conditions become effective upon the date of the approval letter for these findings.

III. FORESTRY

FINDING: Oregon's program includes management measures in conformity with the 6217(g) guidance and enforceable policies and mechanisms to ensure implementation throughout the 6217 management area. However, additional management measures are necessary to attain and maintain water quality standards and fully protect beneficial uses (see section X, pages 16-18).

RATIONALE: The existing State authority to regulate forestry (the Oregon Forest Practices Act, or FPA) is a comprehensive, enforceable program that includes management measures in conformity with the 6217(g) guidance. Any operator conducting a forest operation must comply with the FPA and implementing rules (Forest Practices Rules, or FPR).

Although Oregon has the basic legal and programmatic tools to implement a forestry program in conformity with Section 6217, these tools are inadequate to ensure that water quality standards are attained and

maintained and beneficial uses protected. This conclusion is based on best available information, including the most recent 303(d) listings for Oregon waters, which indicate water quality impairments from forestry. Related to these water quality impairments, Oregon has a number of aquatic species, in particular anadromous salmonids, that are endangered, threatened, or otherwise seriously at risk, due in part to forestry activities that impair coastal water quality and beneficial uses, including salmon spawning, rearing, and migration habitat. For further discussion, see section X, pages 16-18, below.

Section 6217 recognizes that implementation of the (g) measures alone may not always be adequate to protect coastal waters from nonpoint sources of pollution. In these cases, Section 6217 requires the identification and implementation of additional management measures. Thus, Oregon will need to adopt additional management measures for forestry in areas adjacent to coastal waters not attaining or maintaining applicable water quality standards or protecting beneficial uses, or that are threatened by reasonably foreseeable increases in pollutant loadings from new or expanding forestry operations (see section X, pages 16-18, below).

The National Marine Fisheries Service (NMFS), in reviewing the Oregon FPA and implementing rules and the Oregon 6217 program submittal as part of the State's Coastal Salmon Recovery Initiative (CSRI), raised a number of issues related to Oregon's existing forestry program. The State has entered into a Memorandum of Agreement (MOA) with NMFS regarding implementation of the CSRI. That MOA includes a process for NMFS and ODF to develop adjustments to Oregon forest practices to provide a high probability of protecting and restoring aquatic habitat (including water quality) on Oregon forestlands that are important for Oregon coastal coho. Riparian buffers on medium, small, and non-fish bearing streams; risks to aquatic functions from activities in landslide prone areas; and management of cumulative effects were specifically identified in the MOA as among those issues to be addressed. NOAA and EPA share these concerns with regard to the ability of the FPA and FPR to attain water quality standards and fully support beneficial uses, and have asked the state to review these as priority issues in developing additional management measures. See the additional discussion at section X, "Critical Coastal Areas, Additional Management Measures, and Technical Assistance," pages 16-18, below.

The State has the authority, under OAR 629-635-120, to develop and adopt watershed specific rules for forestry in watersheds that have been designated as water quality limited or for watersheds containing threatened or endangered aquatic species. This authority would be useful in developing appropriate additional management measures for forestry; however, the State has not indicated whether or how it intends to implement this process.

X. CRITICAL COASTAL AREAS, ADDITIONAL MANAGEMENT MEASURES AND TECHNICAL ASSISTANCE

FINDING: Oregon's program does not include processes for the identification of critical coastal areas or for the development and continuing revision of management measures applicable to critical coastal areas and cases where the 6217 (g) measures are fully implemented but water quality threats or impairments persist. The program does not describe efforts to provide technical assistance to local governments and the public for implementing additional management measures.

CONDITION: Within two years, Oregon will identify and begin applying additional management measures where water quality impairments and degradation of beneficial uses attributable to forestry exist despite implementation of the (g) measures. Within two years, Oregon will develop a process for the identification of critical coastal areas and a process for developing and revising management measures to be applied in critical coastal areas and in areas where necessary to attain and maintain water quality standards. Also within two years, the State will develop a program to provide technical assistance in the implementation of additional management measures.

RATIONALE: The State had not begun development of these three programmatic elements at the time of

program submission. The program submittal stated that Oregon intended to review the designation of special coastal areas under other programs and initiatives to assess whether such designations are also appropriate for the purposes of Section 6217. In addition, the State intends to develop a list of impaired waters potentially subject to additional management measures. The State submittal indicates that a program to provide technical assistance will be developed after the additional management measures have been identified. Technical assistance may be provided through the ongoing efforts under the 319 program. NOAA and EPA encourage the State to pursue these efforts.

The State recently engaged with NMFS in developing the Coastal Salmon Restoration Initiative (CSRI) to stabilize and restore native coastal salmon populations and prevent the need for a listing of coho salmon as threatened or endangered under the federal Endangered Species Act (ESA). NMFS worked closely with State agencies throughout this process, and has identified a number of concerns with existing state programs that relate to the ability of those programs to protect and maintain essential features of habitat for proposed or listed anadromous salmonids. In developing a process for the identification of critical coastal areas and for developing and revising additional management measures to be applied in critical coastal areas and in areas where necessary to attain and maintain water quality standards, the State needs to consider the issues raised by NMFS and how the additional management measures and critical coastal areas provisions of the coastal nonpoint program can interface with and enhance the CSRI.

As NMFS has described to the State in other documents, such areas might include (1) key spawning, rearing, and migratory habitats of listed anadromous salmonids; (2) existing highly productive, or potentially highly productive, subareas within watersheds; and (3) basins, subbasins, or watersheds that support multiple anadromous salmonid species or Evolutionarily Significant Units, and where restoration actions have a high potential to substantially improve productivity. Core areas for salmonid protection designated under the CSRI, important shellfish harvesting areas, or Natural and Conservation units of estuaries as designated under the Oregon Estuary Plan are examples of areas that might be considered critical coastal areas.

Within two years, Oregon will identify and begin applying additional management measures for forestry. As discussed in section III, above, Oregon's program includes management measures for forestry in conformity with the (g) guidance. Best available information, however, indicates existing water quality impairments attributable to forestry in certain areas, and that the existing FPRs are inadequate to restore water quality and fully support designated beneficial uses. The State has the authority, under OAR 629-635-120, to develop and adopt watershed specific rules for forestry in watersheds that have been designated as water quality limited or for watersheds containing threatened or endangered aquatic species. This authority would be useful in developing appropriate additional management measures for forestry; however, the State has not indicated whether or how it intends to implement this process.

EPA and NOAA have identified areas where existing practices under the FPA and FPR should be strengthened to attain water quality standards and fully support beneficial uses. These areas include protection of medium, small, and non-fish bearing streams, including intermittent streams; protection of areas at high risk for landslides; the ability of forest practices to address cumulative impacts of forestry activities; road density and maintenance, particularly on so-called "legacy" roads; and the adequacy of stream buffers for application of certain chemicals.

Under existing State forest practices, medium, small, and non-fish bearing streams may be subject to loss of sediment retention capacity, increases in delivery of fine sediments, and increases in temperature due to loss of riparian vegetation. Another concern is provision of adequate long-term supplies of large woody debris in medium, small, and non-fish bearing streams, a shortage of which can result in decreased sediment storage in upstream tributaries, increased transport and deposition downstream, and overall adverse impacts to beneficial uses.

"Legacy forest roads" (that is, roads constructed and used prior to adoption of the FPA and not used and maintained since then) were not required to be treated and stabilized before closure. In some locations, this has resulted in significantly altered surface drainage, diversion of water from natural channels, and serious erosion or landslides. The ODF has proposed an expedited voluntary program to inventory and prioritize the upgrading of roads built prior to 1974 on industrial forest lands.

Regarding concerns with harvest activities in high risk landslide areas, evidence indicates that timber harvests on unstable, steep terrain can result in increases in landslide rates of approximately 200 to 400 percent. There are also indications that a relatively small proportion of potentially unstable ground in the Oregon Coast Range is responsible for the majority of landslides in Oregon.

Forest practice rules in effect at the time the Oregon 6217 program was submitted for approval did not require buffers for aerial application of herbicides or fertilizers for type N (non-fishbearing) streams. Such streams comprise significant portions of total stream length in the coastal zone. In January 1997, the ODF revised its rules governing application of chemicals. The new rules require a 60 foot buffer on type N streams for direct aerial application of fungicides and nonbiological insecticides except as approved by the State forester. The rules do not contain restrictions for aerial application of herbicides, which would appear to leave type N streams still at risk.

Cumulative effects of increased water temperature, sediment transport, road density, hydrological modification, and other factors can manifest themselves at a larger system scale and have adverse effects over an entire watershed or basin, rather than at a particular site or stream reach. The scope and pattern of these types of effects have recently become much more apparent through the use of watershed and landscape analysis. Cumulative effects are a concern not only within the forestry sector but across all land use or management measure categories within a watershed.

XI. MONITORING

FINDING: Oregon's program does not include a plan to assess over time the success of the management measures in reducing pollution loads and improving water quality as specified in Section 6217(g)(2)(F).

CONDITION: Within one year, Oregon will include in its program a plan that enables the State to assess over time the extent to which implementation of management measures is reducing pollution loads and improving water quality.

RATIONALE: In the program submittal, Oregon states that both implementation and effectiveness monitoring are needed. The State has also written that it will build on existing water quality monitoring efforts for Section 6217. Further, Oregon has stated that monitoring programs for tracking management measure implementation will be designed as implementation plans are developed by the various agencies. Oregon has not, however, indicated how it will use these programs to assess over time whether the management measures are reducing pollutant loads and improving water quality. Oregon is encouraged to coordinate appropriate aspects of its 6217 monitoring program with the State CSRI.

Oregon should include in its monitoring plan information regarding the number and location of monitoring stations, the types and frequency of water quality data being collected, and the analytic approaches that will be employed in conjunction with existing monitoring efforts to assess the success of management measures in achieving water quality objectives. The State should include some inexpensive tracking of management measure implementation in conjunction with water quality monitoring, as such information is needed to assess the success of management measures in achieving water quality objectives.

Attachment B

Landscape Characterization:

Landscape characterization and assessment establishes a hierarchial evaluation system. At the basin, subbasin, watershed, subwatershed, valley segment, and reach scale - characterization and assessment (1) identifies the distribution of unique "biophysical units," (2) identifies sensitive ecological units, (3) identifies anthropogenic hazards to sensitive ecological units, (4) identifies potential refugia and restoration opportunities, and (5) synthesizes information derived from steps (1) through (4) into a comprehensive water quality strategy. Through this process, important scale-specific issues are identified and addressed.

Landscape characterization and assessment elucidates key indicators of landscape integrity. Scale appropriate indicators are selected to reflect key issues and questions related to identified landscape hazards, risks, and vulnerability. Stratification by biophysical and stream network units as well as identification and evaluation of reference conditions allows one to compare and contrast inherent and management induced variability among similar landscape units. Without appropriate stratification and clustering of biophysical and stream network units, inherent landscape variability may mask significant change to managed systems. Furthermore, best management practices (BMPs) should be designed according to biological and physical constraints of the land unit. Identification of biophysical units allows land managers to tailor BMPs to the disturbance regimes associated with different biological and physical substrates. BMP effectiveness should be compared among similar biophysical units as well as stream network associations and should be contrasted with reference conditions.

Previous studies have been inconclusive regarding BMP effectiveness (Best Management Practice Evaluation Program, Pacific Southwest Region Forest Service). This is likely due to the application of generic, management-based BMPs across a variable landscape. BMP design as well as effectiveness monitoring should consider variability in landscape processes including natural disturbance regimes. Stratification by biophysical unit and stream network association allows BMP design and effectiveness to be assessed within similar landscape contexts.

In addition to variability, monitoring design should address multiple spatial and temporal scales. Statistical sampling designs such as stratified probability sampling design used at multiple scales facilitates an understanding of management activities on the landscape including direct, indirect, and cumulative effects. Long-term status and trend data combined with a nested statistical design produces a powerful tool to evaluate management actions including best management practice effectiveness .

Attachment C

Key Monitoring Questions

1. Develop a set of assessment questions and objectives that the monitoring should address. This should include water quality goals and objectives, interim and final performance measures, schedule, and contingency plans.

2. Determine the indicators that will be used to assess biotic and abiotic conditions; ensure that these indicators can be related to ecological units as well as inherent and anthropogenic stressors.

3. Using information derived from the landscape characterization and assessment, stratify the landscape by biophysical and stream network units and select appropriate sampling periods, sites, and locations.

4. Develop a stratified probability sampling design appropriate for answering assessment questions.
5. Establish reference conditions as standards against which efforts may be measured.

6. Apply the data in answering resource management questions, or in developing new assessment questions.

7. Evaluate the effectiveness of the strategy and its results.

8. Identify ecosystem elements and processes requiring additional research. Fill existing data gaps.

9. Use derived information to validate assumptions and to adaptively manage the resource.

To adequately assess long-term ecological trends, reference conditions should be established. Reference areas should be selected within an array of biophysical units as well as at varying spatial scales. This information is critical to the evaluation of management and restoration programs. Potential criteria to identify appropriate reference areas include (adapted from Moyle and Sato 1991):

1. Contains a nearly complete set of native biota;

2. Presence of natural disturbance regimes/anthropogenic disturbance is low;

3. Intact watershed processes providing necessary structure and function for community persistence;

4. High degree of resistance to invasion by non-native species;

5. Presence of a substantial percentage of the regional aquatic *flora* and *fauna*;

6. High degree of habitat diversity;

7. Supports large populations capable of persistence in the face of demographic or genetic stochasticity.